National Institute of Environmental Health Sciences

Predictive indicators for Ross River virus infection in the Darwin area of tropical northern Australia, using long-term mosquito trapping data

Author(s): Jacups SP, Whelan PI, Markey PG, Cleland SJ, Williamson GJ, Currie BJ
Year: 2008
Journal: Tropical Medicine & International Health. 13 (7): 943-952

Abstract:

Objectives To describe the epidemiology of Ross River virus (RRV) infection in the endemic Darwin region of tropical northern Australia and to develop a predictive model for RRV infections. Methods Analysis of laboratory confirmed cases of RRV infection between 01 January 1991 and 30 June 2006, together with climate, tidal and mosquito data collected weekly over the study period from 11 trap sites around Darwin. The epidemiology was described, correlations with various lag times were performed, followed by Poisson modelling to determine the best main effects model to predict RRV infection. Results Ross River virus infection was reported equally in males and females in 1256 people over the 15.5 years. Average annual incidence was 113/100 000 people. Infections peaked in the 30–34 age-group for both sexes. Correlations revealed strong associations between monthly RRV infections and climatic variables and also each of the four implicated mosquito species populations. Three models were created to identify the best predictors of RRV infections for the Darwin area. The climate-only model included total rainfall, average daily minimum temperature and maximum tide. This model explained 44.3% deviance. Using vector-only variables, the best fit was obtained with average monthly trap numbers of Culex annulirostris, Aedes phaecasiatus, Aedes notoscriptus and Aedes vigilax. This model explained 59.5% deviance. The best global model included rainfall, minimum temperature and three mosquito species. This model explained 63.5% deviance, and predicted disease accurately. Conclusions We have produced a model that accurately predicts RRV infections throughout the year, in the Darwin region. Our model also indicates that predicted anthropogenic global climatic changes may result in an increase in RRV infections. Further research needs to target other high-risk areas elsewhere in tropical Australia to ascertain the best local climatic and vector predictive RRV infection models for each region. This methodology can also be tested for assessing utility of predictive models for other mosquito-borne diseases endemic to locations outside Australia.

Source: Ask your librarian to help locate this item.

Resource Description

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Sea Level Rise, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Tropical

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Ross River Virus

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content